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(72) V.I. Samsonenko, V.A. Bojchenko
(56) V.A. Brazhnikov, E.G. Ivanov, V.P. Milovanov.

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(54) METHOD OF REGULATING THE DRILLING PROCESS

columns 3-4

The starting data for resolving the set task of regulating the drilling process is the following:

- duration of works not included in mechanical drilling ($t_{p,o}$) which is determined from the dependency $t_{p,o} = f(L)$ which is built basing on statistical processing of the balance of calendar time for drilling wells located in the given area or in neighboring areas depending on the depth L of the well;

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C_D

- the ratio $\frac{C_D}{C_q}$ - the price of the boring bit to the cost of one hour of operation of the drilling machine.

The price of the boring bit (C_D) and the cost of one hour of operation of the drilling machine (C_q) are accepted in accordance with the currently existing "Price List for Constructing Oil and Gas Wells (per region)" or are calculated according to the norms included in the existing "Reference Book of the Enlarged Estimated Norms for Constructing Oil and Gas Wells".

- designed meanings of the parameters concerning the drilling process regime: loads per a boring bit (G_{np}), frequencies of rotation of a rotor table (n_{np}), slurry consumption (Q_{np}) which are taken from the geological-and-technical order (GTN) comprising a composite part of the optimized technical design for drilling a well;

columns 9 and 10

The optimum predictable time of mechanical drilling as a whole for a boring bit travel is determined using the following formula:

$$t_{\text{opt}} = T_{1-1} + t_c \quad (8)$$

The given formula (8) permits to carry out the point forecast of the optimum mechanical drilling in the travel of the boring bit. However, it is necessary to have an interval forecast for drilling due to high variability (changeability) of $V_{e,x}$ in time. Such a forecast is made using the value of the standard deviation which is determined by formula (21) of the measured meanings of $V_{e,x}$ in the 1 - bed (layer) of uniform drillability relative to trend $V_1 = f(t)$.

columns 13-14

CLAIMS

A method for regulating the drilling process based on the assignment of drilling process regime, time of statistical prediction of the moment for lifting a boring bit, on measuring a mechanical speed of heading and time of drilling, on keeping the assigned load on the boring bit and speed of rotation thereof till the moment of lifting said boring bit, characterised in that, in order to improve the efficiency of the drilling process in beds, being non-homogeneous in drillability, by increasing the accuracy of determining the moment for lifting the boring bit, and by increasing the efficiency of correcting parameters of drilling process regime, the boundaries of layers drillability change are established, for each layer of the same drillability optimum settings for the load per a boring bit, speed of rotation and the consumption of the slurry are defined, set and kept, and the optimum time of mechanical drilling for a full travel of the boring bit is determined in accordance with the formula:

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$$\hat{t}_{\text{off}} = T_{1-1} + t_{c_1},$$

wherein T_{1-1} is the sum of pure time of mechanical drilling of all beds of uniform drillability preceding the 1 - bed in which the mechanical drilling is carried out at the present time;

t_{c_1} - is the optimum predictive time of mechanical drilling in the 1 - bed the expiration of which is the moment for lifting the boring bit for a change.